Inventing The Future

Three worlds – television, computers and publishing – are in collision. The result will be interactive multimedia, a remarkable new means of communicating, entertaining and informing. Max Whitby *explains why Apple's new CD-ROM drive is one key to this unexplored realm.*

Four and a half years ago Steve Jobs, co-founder of Apple, was in Britain to promote the newly-launched Macintosh. He gave an impressive demonstration and I asked him what novel applications he imagined people would find for this powerful machine by the late 1980s. At the time, wordprocessors, spreadsheets, databases and games were more or less the only software in town. *MacPaint*, bundled with Apple's new machine, was a revolution. Jobs replied, somewhat to my disappointment, that he was sure something wonderful would emerge, but that he had no clear idea what.

Today with hindsight it is easy to identify publishing as the single most important commercial development in personal computer software since the Macintosh appeared. Apple defined a new industry arena and ensured their own corporate success in the process. Now the next wave is taking shape and rising towards the beach. Interactive multimedia is set to transform our dealings with computers and open a new chapter in the history of communication.

The Monster Has Two Heads

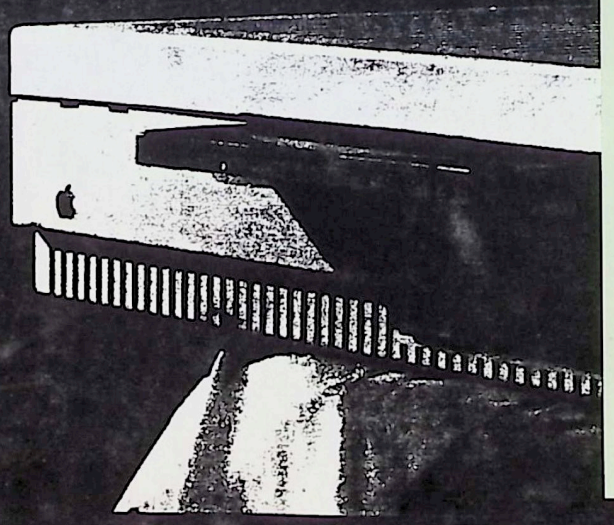
The vehicle for most interactive multimedia applications in the near future will be CD-ROM. Based on the same technology as music CDs (which use a digital recording standard known as CD-A) CD-ROMs are capable of holding prodigious amounts of computer data – either 550M or 630M depending on the file format used. A single 5" disk, weighing less than an ounce and costing only a few dollars to press, can store more information than 700 double-sided floppies. That is the equivalent of 270,000 printed pages of text, 2000 high-resolution colour images, 20 hours of recorded speech, or any combination of these elements.

Impressive as this capacity is (two sets of the Encyclopaedia Britannica fit on a disk) the CD-ROM is not perfect. It has, to abuse the English language, two Achilles' heels. First, as the acronym ROM (Read Only Memory) implies, the laser-read data on a disk in immutable – it cannot be changed, deleted or extended. Secondly, CD-ROM drives are quite slow. Their specification is based on the minimum data transfer rate required to play high fidelity stereo music. This means that the Macintosh's System can pull standard files off the CD-ROM drive at a maximum rate of only 153.6K per second. This may sound reasonable but it is less than 20% of the bandwidth of the SCSI connection and a good deal slower than a magnetic hard disk. With full screen eight-bit colour images consuming upwards of 300K of memory apiece, it is a serious limitation.

To use Apple's CD-ROM drive you must place a special file in the System Folder, connect up the SCSI cable, and Restart the machine. When a CD-ROM is inserted into the player it appears on the Desktop as a standard volume with a special icon identifying it as a CD-ROM. Double-clicking this icon causes a familiar contents window to pop open with further files and folders inside. In short, a CD-ROM behaves exactly like a regular HFS volume with the exception that it is permanently locked and any changes made to the display format – such as view by name – are only temporary.

The AppleCD SC Drive is compatible with four current data standards – HFS (Apple's proprietary Macintosh file structure), The Yellow Book (a low-level CD-ROM standard defined by Philips and Sony), High Sierra (an extension of the Yellow Book format agreed by various manufacturers at the High Sierra Hotel near Lake Tahoe in 1986 which allows hierarchical filing compatible with many different computer systems), and finally ProDOS (the file structure used by the Apple II family).

Apple's CD-ROM drive is capable of doing more than simply reading data though. It is also a fully fledged CD-Audio player with phono plugs on the back to



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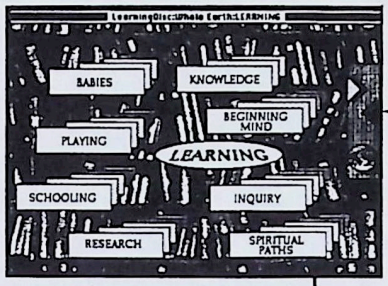
Interactive Multimedia In Action

More than most subjects, the nature of interactive multimedia is frustratingly difficult to communicate in words alone. *Max Whitby* took a detailed look at some of the *HyperCard* stacks on The Apple Learning Disc, a sampler CD-ROM that Apple gave away to everyone who attended the Microsoft CD-ROM conference in Seattle earlier this year.

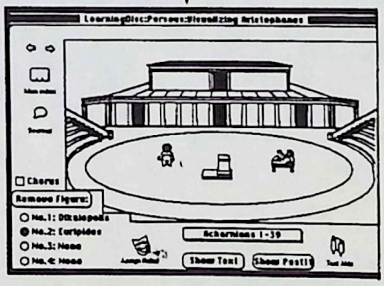
This example of work in the new medium is the merest hint of things to come. Add colour, add 3D animations, above all add the skills and experience of the film and television industry and you have the atomic bomb of the information age. Interactive multimedia will be a cinematic experience. It will combine the buzz of programming a computer with the grip of a good novel. It will break the barrier between learning and entertainment. It will slowly but surely find its way into all our lives.



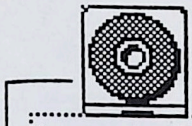
The Whole Earth stack is by far the largest item on the disk. In fact it is a group of 18 stacks composed of over 8000 cards that contain all of the text and many of the illustrations in the Whole Earth Catalogue, a long-established resource for self-education and self-sufficiency. A significant addition to the paper version is over two hours of sound, mainly 30-second samples of longer music recordings available by mail order. These sounds are stored as digitised resources within *HyperCard* and should be distinguished from separate CD-Audio tracks that can also be mixed with other data on a CD-ROM.

It is not all history and education on the Apple Learning Disc. Buried in the dark recesses of the Whole Earth folder is The Guide To EverWhere Demo. This is probably the most bizarre item of computer software ever created, a kind of interactive fantasy nightmare with a soundtrack reminiscent of a religious cocktail party in the rumbling belly of a whale on acid.

The man himself – Bill Atkinson, the father of *HyperCard*. This is a card from a delightful stack called BillSez, another off-beat discovery in the Whole Earth folder, created by Tim Oren, the genius at Apple who designed and managed the Apple Learning Disc project. The stack features an interview with Atkinson from Fabrice Florin's 1984 film about the Hacker's Conference in which Bill talks about an idea for a piece of software that would link everything together...



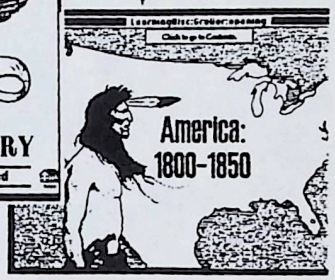
Project Perseus is an ambitious plan to create a collection of information relating to Classical Greece including 100M of text and 10,000 still images to be stored on a videodisk. The Perseus stack on the Apple disk is a small sample of some ideas for organising and displaying this kind of information. It includes Greek texts with parallel English translations and a remarkable stack that allows you to select characters from Aristophanes and position them on a representation of the stage.

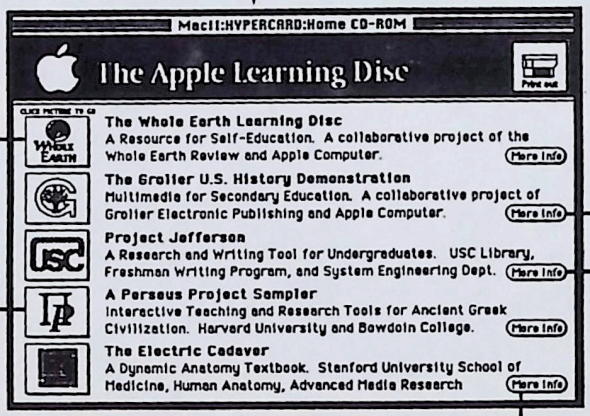


LearningDisc

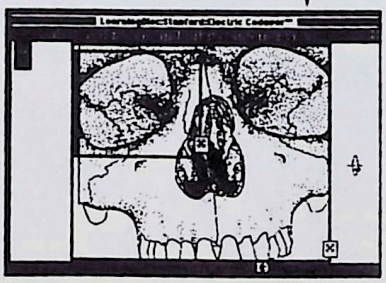
This is the Home card for the Apple Learning Disc. The first two projects are the fruit of design collaborations between Apple and publishing companies – The Whole Earth Review and Grolier Electronic Publishing. The remaining three projects are independent works-in-progress by university groups. The Apple disk is not intended to be a finished product, but rather a sample of ideas and possibilities for *HyperCard* and CD-ROM. All of the stacks are designed to play on a standard Macintosh with 1M of memory. Only 25% of the space is used (that is still 160M!) and none of the stacks employ colour graphics.

This is the title card of the Grolier US History Demonstration, easily the most impressive collection of stacks on the Apple Learning Disc. The project is a collaboration between Apple and Grolier Electronic Publishing, an American company who have pioneered publishing in the new digital media. The chief designer for Grolier is Peter Cook who is based in London.

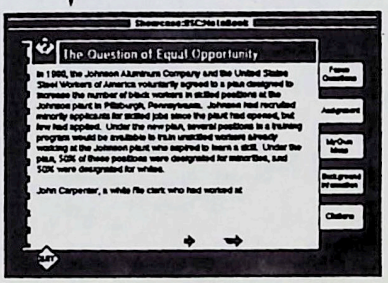



Macii:HYPERCARD:Home CD-ROM
The Apple Learning Disc
The Whole Earth Learning Disc
A Resource for Self-Education. A collaborative project of the Whole Earth Review and Apple Computer.
More Info
The Grolier U.S. History Demonstration
Multimedia for Secondary Education. A collaborative project of Grolier Electronic Publishing and Apple Computer.
More Info
Project Jefferson
A Research and Writing Tool for Undergraduates. USC Library, Freshman Writing Program, and System Engineering Dept.
More Info
A Perseus Project Sampler
Interactive Teaching and Research Tools for Ancient Greek Civilization. Harvard University and Bowdoin College.
More Info
The Electric Cadaver
A Dynamic Anatomy Textbook. Stanford University School of Medicine, Human Anatomy, Advanced Media Research
More Info

The Grolier US History Demonstration covers American life, politics and culture during the period 1800 to 1850. It consists of 13 stacks containing around 15M of data including a large amount of text, high-quality digitised images, a variety of maps, and a limited number of sound recordings. Most of the material was taken from Grolier's Americana series and had to be specially converted into digital form for the project. While the subject matter is a little dry, and obviously of more immediate interest to an American audience, these stacks are an exciting example of what is possible. The artwork and the interface are beautifully presented and there are some highly innovative ideas demonstrated in the design.



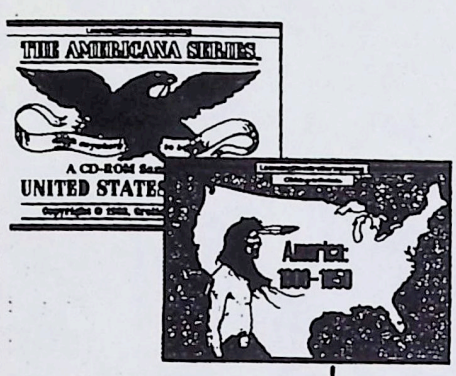
Cutting up real human bodies is messy and expensive, so why not let *HyperCard* do it instead! This is a stack created by two doctors at the Stanford University of Medicine intended to help students learn anatomy. In the simple version provided on the Apple disk you are presented with a human skeleton. Clicking on a particular area (only the top half of the body seems to be implemented here) will take you to a close-up of that part of the anatomy. Several levels of zoom are available and rotations, X-ray views and labels with the correct medical names can also be selected. In the final version, a videodisk with thousands of colour pictures of a real dissection will be under control of the *HyperCard* stack, allowing students to peel off layers of skin and tissue to provide a complete anatomical atlas of the human body. Not for the squeamish.

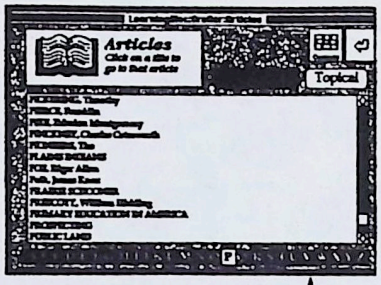


One interesting application for *HyperCard* is as an educational tool to help students. This stack is from a development at the University of Southern California called Project Jefferson. The idea is to provide students with an electronic notebook to collect and organise research material as they browse through collections of background data. To use the Project Jefferson stacks, they must first be copied from CD-ROM onto a magnetic drive. This is necessary so that material can be recorded and preserved between sessions.

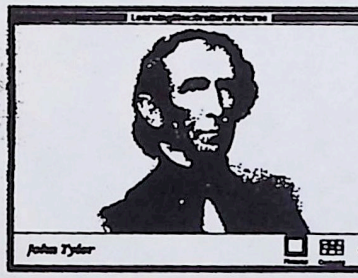
Discovering New Frontiers

The Grolier US History collection of stacks demonstrates just how versatile and comprehensive this new medium can be.

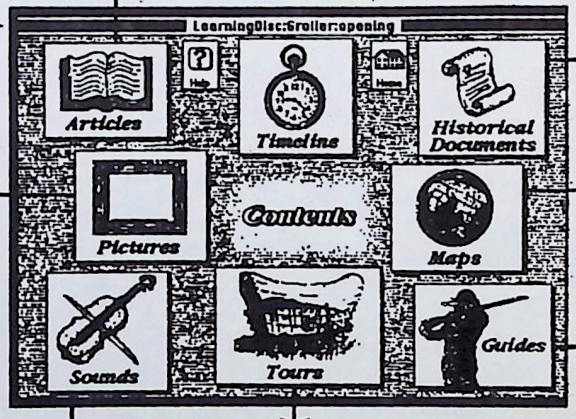




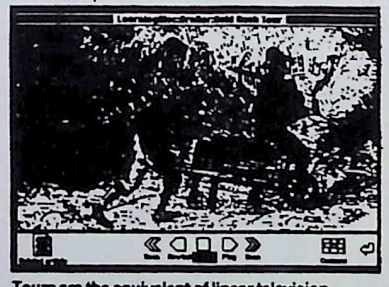
The several hundred articles on the US History Demonstration are organised alphabetically by title. Selecting a letter from the alphabet at the bottom works like flipping an index page in an address book. Clicking on a title takes you directly to that article. Top right is a button that changes the display to a presentation of the same material by topic, making it easier to locate groups of related articles on a given subject. Just above this button are two icons common to most cards. 'Contents' jumps immediately back to the History Demonstration Home card, and the arrow symbol takes you back one step along the trail you have traversed. *HyperCard*'s 'Recent' command is always available to move instantly to any of the last 100 cards you have viewed.



Like sounds, only a rudimentary collection of pictures are implemented for access on the disk. These demonstrate the idea rather than provide a useful resource. The quality of scanned artwork is high and was achieved by careful selection of source material and considerable post-scanning work retouching the images. Etchings and line drawings from the period are naturals for conversion to the Macintosh's black-and-white screen. Other subjects, such as natural history, may present more of a problem unless digitised in colour or greyscale for a Macintosh II.

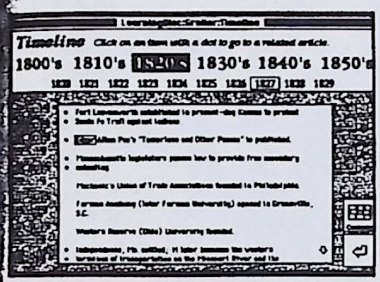


Five digitised songs are provided in a rather simplistic way from a menu. Apart from the tours, this is the only use of sound in the US History Demonstration, which is a shame, since sound is one of the most effective tools in interactive multimedia. While the internal speaker is adequate for basic playback, for dramatically improved results an amplifier and loudspeaker should be plugged into the audio socket on the back of the Macintosh. This means there are potentially two independent sources of sound from a CD-ROM – the direct CD-A output on the AppleCD SC drive, and the output of the Macintosh's own digital sound system. Plugging in amplifiers to obtain the correct balance is a problem yet to be resolved.

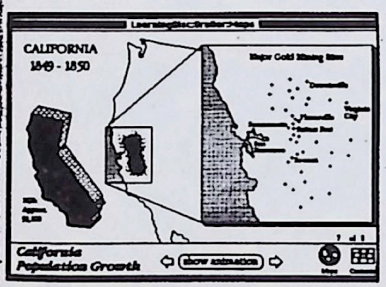


Tours are the equivalent of linear television presentations, using sounds and visual images and linked to the articles in the collections. Only one tour, "The California Gold Rush", is implemented although several are indicated on greyed-out buttons. The tour has music, sound effects, and a narration. Replay can be controlled by a VCR-style control panel at the bottom of the screen. At any time the tour, which lasts about three minutes, can be stopped and a related article read. These articles are available via an icon at the bottom left corner of the screen, and the one you are shown adjusts according to the changing context of the presentation.

This menu is effectively the Home card of the US History Demonstration stacks. It shows at a glance the main resources available and clicking on any of the eight main options takes you immediately to that choice. From most places within the intricately linked network that comprises the data set, it is possible to jump back to this card by selecting the 'Contents' icon. Each of the choices on offer represents a different window on the information in the collection. These are best explained by starting with 'Articles' in the top left and then proceeding clockwise.



Timeline provides a different window on the same collection of articles. Any date from 1800 to 1850 may be chosen, whereupon the central field displays a scrollable list of principal events from that year. Most entries have bullet marks on the left of the line, indicating that an article is available. Clicking on the line takes you there. Thus the article on Edgar Allan Poe can be accessed by several different routes – by title, by subject, or by the date of a significant event in Poe's career.



You may wonder why 'Historical Documents' have been skipped from this overview of the US History Demonstration. Well the reason is that hardly any have been included – the button simply stands for the idea. Maps on the other hand are fully implemented and constitute one of the best options in the collection. Several maps are available to show population growth and westward migration during the era. All maps have several frames that can be stepped through individually or animated to give a sense of change over time. Once again, HyperText links are provided to jump to articles relevant to particular places or events.

Guides are the single most exciting idea on the Learning Disc. They provide another window on the hundreds of articles and other resources in the collection, but a window with a difference. Ten different characters are available, each representing an important trade or social identity from the period. Selecting a guide provides you with that character's perspective on events and issues. The Guide's icon remains with you as you navigate through the database and selecting the Guide will take you to a new item that he or she thinks you should see. This is an extraordinarily powerful idea, perfect for communicating a particular interest or point of view, that is bound to be copied and extended in future CD-ROM titles.

connect to a stereo amplifier and speakers. At first sight it's hard to see how the drive accomplishes this feat since the only external control consists of a single volume knob. The secret is a desk accessory, *CD Remote*, which turns the Macintosh/CD-ROM drive combination into the world's most sophisticated (and expensive) CD player. All standard facilities are provided such as track selection, rapid scan, pause and eject. In addition, a 'Grow' button causes the DA's window to expand, revealing a track list that can be customised to each disk in your collection. Favourite tracks can be programmed in any sequence and the system will remember your preferences next time you insert that disk.

Once initiated, the drive's operation as a CD player is independent of the Macintosh, which means you can write the novel or fiddle the spreadsheet to the high-fidelity musical accompaniment of your choice. Yes, this is a great step forward in the technology of enjoyably wasting time.

Into The Labyrinth

CD-ROM provides one essential half of the interactive multimedia equation – random access to large oceans of information. On its own, however, this technological feat is not enough. A means must be found to organise the data and to orchestrate its presentation. Software is needed to handle substantial collections of photographs, moving video, animations, music, speech, sound effects, graphics and text. Fortunately the solution is at hand. *HyperCard* will provide the soul of the new medium.

When *HyperCard* appeared a year ago it seemed to arrive out of the blue with no visible antecedants in the world of computer software. In fact, as most of us writing about it at that time failed to realise, *HyperCard* is bang in the mainstream of interactive technology that has been under development in academic research settings such as the Massachusetts Institute of Technology in America since at least the 1960s. Bill Atkinson's work on *HyperCard* was strongly influenced by people working in this field, and his creation is a software engine, tailor-made for interactive multimedia applications.

In the months and years ahead, *HyperCard* and the tools that develop from it, will form the basis of a new publishing industry. Using CD-ROM as the means of distribution, products of this new enterprise will be strange hybrids of computer software, books and television programmes. They will be played back on the Macintosh and its successors, as well as dedicated multimedia devices (not Macintosh-compatible) manufactured by companies like Philips and Sony. Initially products will be aimed at educational and corporate markets. In due course they will be targeted at individuals in the home.

But, getting back to the present, is there enough software around to make the CD-ROM drive worth considering? The first commercial multimedia releases are still under construction in design labs around the world and it will be months before they start to ship.

There are, however, a growing number of CD-ROM titles that simply supply large quantities of conventional data in a convenient form. There are disks with one-hundred megabyte collections of clip art for desktop publishing, thousands of Public Domain applications and *HyperCard* stacks, and soon there will be dictionaries, a thesaurus and probably an encyclopaedia. These applications simply treat the CD-ROM drive as an enormous on-line archive providing easy access to over half a gigabyte of information.

If few of these early disks seem interesting don't be discouraged. CD-ROMs are set to do for the Macintosh what floppy disks did for the Apple II. The new drive is a ticket to the future and there is an exciting ride in store.

MAX WHITBY is a television producer and a regular contributor to *MacUser*. He specialises in *HyperCard* applications and interactive multimedia, and has recently joined the BBC's Interactive Television Unit as Senior Producer.

About AppleCD SC Drive

Although the AppleCD SC Drive costs more than the competition and access time is not the fastest, Apple has a reputation for reliable hardware and their own-badge products are guaranteed to be compatible with future software. An attractive unit which doubles up as a sophisticated audio CD player when connected to an amplifier and speakers. It could be worth postponing purchase until more CD-ROM's have been published.

Manufacturer: Apple Computer UK
Price: [illegible] (+ VAT)